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EXAMINER

SINGH, PREM C

ART UNIT

PAPER NUMBER

1797

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PAPER

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary	Application No. 10/551,212	Applicant(s) BEREZUTSKIY, VLADIMIR MIKHAILOVICH	
	Examiner PREM C. SINGH	Art Unit 1797	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --
Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 24 September 2009.
- 2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1, 11, 18-23, 26-40, 42, 43, 45, 46 and 48-61 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1, 11, 18-23, 26-40, 42, 43, 45, 46 and 48-61 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All b) ☐ Some * c) ☐ None of:
1. ☒ Certified copies of the priority documents have been received.
 2. ☐ Certified copies of the priority documents have been received in Application No. _____.
 3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- * See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|--|---|
| 1) <input type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413)
Paper No(s)/Mail Date. _____ |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | 5) <input type="checkbox"/> Notice of Informal Patent Application |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO/SB/08)
Paper No(s)/Mail Date _____ | 6) <input type="checkbox"/> Other: _____ |

DETAILED ACTION

Response to Amendment

1. Amendment to claims 1, 11, 18, 19, 26, 27 and 50 and cancellation of claims 2-10, 12-17, 24, 25, 41, 44 and 47 is noted.
2. New ground of rejection necessitated by claim amendments follows.

Claim Rejections - 35 USC § 103

3. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

The factual inquiries set forth in *Graham v. John Deere Co.*, 383 U.S. 1, 148 USPQ 459 (1966), that are applied for establishing a background for determining obviousness under 35 U.S.C. 103(a) are summarized as follows:

1. Determining the scope and contents of the prior art.
2. Ascertaining the differences between the prior art and the claims at issue.
3. Resolving the level of ordinary skill in the pertinent art.
4. Considering objective evidence present in the application indicating obviousness or nonobviousness.

Art Unit: 1797

4. Claims 1,11, 18, 20-23, 26-40, 42, 43, and 50-61 are rejected under 35 U.S.C. 103(a) as being unpatentable over Piccoli et al (US Patent 6,118,037) in view of Wismann et al (WO 01/42392 A2).

5. With respect to claim 1, Piccoli discloses a method for treatment of a hydrocarbon liquid media, which includes adsorption of impurities comprising thiophenes and their higher homologs and heteroatom compounds involving nitrogen and oxygen (See column 3, lines 34-47) contained in the liquid media by a particulate catalyst impregnated sorbent at a temperature between 0°C and 150°C, separation and removal of impurities adsorbed (See column 2, lines 40-47, 62-67; column 3, lines 1-6), while separation and removal of oxides of impurities is executed by washing the particulate catalyst impregnated sorbent with a polar solvent and regeneration of the particulate catalyst impregnated sorbent is carried out with heat and/or by the blowing through a hot gas at a temperature between 100 and 200°C (See column 2, lines 58-61; column 3, lines 7-16).

Piccoli does not appear to specifically disclose a distillation step following washing, however, the invention does disclose washing with polar solvents, water, acetone, methanol, ethyl acetate or their mixtures such as hydrocarbons , paraffins from 5 to 8 carbon atom , or aromatics (See column 3, lines 14-17). Piccoli also discloses removal of liquid from the adsorbrd material (See column 6, line 32, 56; column 7, lines 25-28).

Thus, it would have been obvious to one skilled in the art at the time of invention to use any appropriate method, including distillation as claimed, to remove wash liquid from the adsorbed material.

Piccoli invention does not specifically disclose oxidation of impurities.

Wismann discloses a process similar to Piccoli for treatment of hydrocarbon liquids using an adsorbent (See title and abstract). Wismann also discloses removal of mercaptan sulfur from petroleum distillates by sorption or simultaneous sorption and oxidation (See page 1, lines 7-8). Wismann further discloses that as the mercaptan enters the pores, oxygen from air or some other source, also enters the pores and attacks the mercaptan to convert it to disulfide, which is highly soluble in oil within the pore. This allows a concentration gradient allowing influx of the mercaptan into pores and outflux of disulfides out with the distillate to produce sweet distillate product (See page 3, lines 1-6).

Thus, it would have been obvious to one skilled in the art at the time of invention to modify Piccoli invention and add an oxidizing step as disclosed by Wismann to enhance removal of mercaptan sulfur from the distillate product. It is to be noted that oxidation converts mercaptans to disulfides. Similarly, other impurities disclosed by Piccoli are expected to convert to their respective oxides.

6. With Respect to claim 11, Piccoli invention discloses using hydrocarbon streams of varying composition and origin, including fuel oil (See column 1, lines 10-11; column 2, lines 63-64; column 3, lines 48-55; column 5, lines 43-47; column 7, lines 14-19). It is

Art Unit: 1797

to be noted that "hydrocarbon streams of varying composition and origin" encompasses all the claimed hydrocarbons.

Wismann also discloses using hydrocarbons comprising gasoline, naphtha, kerosene, diesel and fuel oils (See page 3, lines 17-19).

7. With respect to claim 18, Piccoli invention discloses that thiophene and higher homologs comprise mercaptans, benzothiophenes, thiophenes, alkylthiophenes, dialkylsulfides (See column 3, lines 38-41).

8. With respect to claims 20-23, Wismann invention discloses that oxidizing agents are selected from the group consisting of air, oxygen and hydrogen peroxide (See claim 7). Wismann also discloses that oxygen from any source can be used (See page 3, lines 1-2). Although Wismann does not specifically disclose using ozone, it is expected that any oxygen source, including ozone, should be equally effective in the oxidation process.

9. With respect to claims 26-40, 42, and 43, Piccoli invention discloses using an adsorber essentially consisting of silica gel modified with one or more metals from the elements of Group IV b, V b, VIII, I b, II b or from tin, lead or bismuth, preferably selected from zinc, iron, molybdenum, vanadium, tungsten, tin, platinum, copper and chromium (See column 2, lines 66-67; column 3, lines 1-5). Piccoli also discloses that

Art Unit: 1797

the quantity of metals specified above is between 0.001 and 5 wt% with respect to the end catalyst.

Wismann discloses using commercially available activated carbon or catalyst impregnated carbon (See page 2, lines 25-26; page 4, lines 5-9).

Although, Piccoli invention does not specifically disclose the ratio of metals in the catalyst system, however, the invention does disclose one or more metals and the total percentage between 0.001 to 5 wt%. Also, since the ratio of metals in the finished catalyst is a result-effective variable, it is expected to be optimized by one skilled in the art by routine experimentation. See *In re Boesch*, 617 F.2d 272, 205 USPQ 215 (CCPA 1980).

10. With respect to claims 50-59, Piccoli discloses, "In the washing step, such as polar solvents, water, acetone, methanol, ethyl acetate, or their mixtures, such as hydrocarbons, paraffins with from 5 to 8 carbon atom, or aromatic, can be used" (Column 3, lines 13-16). Although Piccoli invention does not specifically disclose using ethanol, dichloroethane, dichloromethane, dichlorobenzene, however, it is to be noted that these solvents and their combinations are obvious variants of the disclosed solvents.

11. With respect to claims 60 and 61, Piccoli invention discloses that the impregnation is carried out and the water is removed by gently heating the solid under movement (See column 5, lines 8-10). Piccoli also discloses adsorption step at a

Art Unit: 1797

temperature of 0 to 150°C and a regeneration step by means of thermal treatment in a stream of inert gas, at a temperature ranging from 100 to 200°C (See column 2, lines 40-47). Thus, it would have been obvious to one skilled in the art at the time of invention to modify Piccoli invention and specify the temperature in the drying step. It is expected that the temperature in the drying step will be in a range, including as claimed, because it should necessarily be lower than the temperature in the regeneration step in order to maintain catalytic activity. Piccoli's heating of solid under movement should have similar effect as that of blowing a hot gas during heating.

12. Claims 19, 45 and 46 are rejected under 35 U.S.C. 103(a) as being unpatentable over Piccoli et al (US Patent 6,118,037) in view of Wismann et al (WO 01/42392 A2) and further in view of Fleck et al (US Patent 2,925,381).

13. With Respect to claim 19, Piccoli does not specifically disclose coal liquids.

Piccoli invention discloses host liquid to be hydrocarbon streams of varying composition and origin (See column 1, lines 10-11; column 2, lines 63-64; column 3, lines 48-55). It is to be noted that hydrocarbons from different origins comprise petroleum, and other carbonaceous liquids for example, shale and tar.

Fleck discloses a process similar to Piccoli for removal of organic nitrogen compounds from hydrocarbons using a sorbent (See title and column 1, lines 15-19).

Fleck discloses using hydrocarbons including petroleum, coal tar oil fractions and shale oils among others (See column 1, lines 17-19, 46-50).

Thus, it would have been obvious to one skilled in the art at the time of invention to modify Piccoli invention and use coal liquids as disclosed by Fleck, because they are supposed to be functionally similar to the liquids used by Piccoli.

14. With respect to claims 45 and 46, Piccoli invention discloses the use of 13X zeolite as a sorbent, however, the invention does not specifically disclose the pore size of the zeolite.

Fleck discloses use of 10 X and 13X zeolites having pore diameters averaging 10 Å and 13 Å, respectively (See column 3, lines 74-75; column 4, lines 1-5).

Thus, it is expected that the zeolite used by Piccoli should also have pore diameter averaging 13 Å.

15. Claims 48 and 49 are rejected under 35 U.S.C. 103(a) as being unpatentable over Piccoli et al (US Patent 6,118,037) in view of Wismann et al (WO 01/42392 A2) and further in view of Stowe (US Patent 5,035,804).

16. With respect to claims 48 and 49, Piccoli discloses silica gel, zeolite, and inorganic oxides, for example alumina (See column 1, lines 41-44; column 2, lines 20-30, 65-67) as sorbent support, however, the invention does not specifically disclose perlite as a support.

Stowe discloses a process of removing hydrocarbons from water by adsorption over a sorbent including perlite and sand (See abstract).

Thus, it would have been obvious to one skilled in the art at the time of invention to modify combined Piccoli and Wismann invention by producing it would have been obvious to one skilled in the art at the time of invention to modify combined Piccoli and Wismann invention by using perlite as a support for the adsorptive process because it is expected that perlite and silica gel would be functionally similar for adsorbing impurities. Also, since the percentage of perlite in the sorbent composition is a result-effective variable, it is expected to be optimized by one skilled in the art by routine experimentation. See *In re Boesch*, 617 F.2d 272, 205 USPQ 215 (CCPA 1980).

Response to Arguments

17. Applicant's arguments filed 09/24/2009 have been fully considered but they are not persuasive.

18. In the arguments on page 8 and 9, the Applicant argues that Piccoli teaches removal of impurities by adsorption alone without any oxidation using a sorbent. There is no oxidation step. Wismann teaches specifically only the removal of odor causing mercaptans by oxidation and adsorption. Mercaptan compounds consist of a sulfur atom attached to a hydrogen atom and to only one carbon atom. The mercaptans are oxidized to sulfides that are non-odorous. On the other hand, amended Claim 1 teaches the oxidation of thiophenes and their higher homologs to oxidized compounds and their adsorption on a particulate catalyst impregnated sorbent.

The Applicant's argument is not persuasive because Piccoli teaches sorption. Wismann discloses use of sorption or simultaneous sorption and oxidation (See page 1, lines 7-9). The claim requires ".....impurities comprising thiophenes and their higher homologs, and/or heteroatom compounds involving nitrogen and/or oxygen.....". Piccoli teaches all the claimed impurities. Wismann discloses significant reduction in mercaptan sulfur and some reduction in total sulfur (See page 9, lines 3-4). It is to be noted that "total sulfur" should necessarily comprise thiophenes and their higher homologs. Thus, the combined teachings of Piccoli and Wismann disclose every element of the claimed invention.

19. In the arguments on page 9 and 10, the Applicant describes experiments conducted and the advantages with the claimed method and argues that thiophenes and their higher homologs inherently are significantly different from mercaptans because the sulfur atom in the former are attached to not one but two carbon atoms forming a much more hindered structure than mercaptans. The adsorbed oxidized thiophene sulfur compound is also much more easily removed due to its high polarity by washing with a polar solvent to affect the rejuvenation of the particulate catalyst impregnated sorbent. Thus the claimed method is significantly more selective and efficient than a method that uses only adsorption as described by Piccoli.

The Applicant's argument is not persuasive because Piccoli discloses benzothiophenes and their higher homologs as claimed (See column 3, lines 38-41). Also, as discussed earlier, Wismann removes mercaptans as well as total sulfur (See

Art Unit: 1797

page 9, lines 3-4). Total sulfur should inherently comprise thiophenes and their higher homologs. Thus, the combined teachings of Piccoli and Wismann disclose the claimed process and are expected to have similar advantages as claimed.

20. In conclusion, the claimed invention is *prima facie* obvious Piccoli in view of Wismann, Fleck and Stowe.

Conclusion

21. Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

Art Unit: 1797

Any inquiry concerning this communication or earlier communications from the examiner should be directed to PREM C. SINGH whose telephone number is (571)272-6381. The examiner can normally be reached on 7:00 AM to 3:30 PM.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Glenn Caldarola can be reached on 571-272-1444. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

PS 120509

/In Suk Bullock/
Primary Examiner, Art Unit 1797